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UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

Summary Review of Monthly Reports*
for
SOIL CONSERVATION SERVICE RESEARCH**
JANUARY 1951

EROSION CONTROL PRACTICES DIVISION

Supplemental Irrigation of Forage Crops - O. W. Beale, Clemson, South Carolina.-"Hay yields from the irrigated forage crop plots were considerably higher than from the unirrigated plots during the growing period from May 16 to November 21, 1950. The total yields are given in Table 1. Five irrigations, totaling 5.8 inches of water, were made and rainfall during this period was 26.2 inches. The additional water caused an increase in alfalfa yields of 19%, ladino clover 68%, fescue 50% and a mixture of fescue - ladino clover 64%.

"Damage from bacterial and fungus diseases appeared to be aggravated in the legumes where the high soil moisture level was maintained, and stands were thinned considerably by the end of the summer. Therefore, the greatest response to irrigation was in the early summer prior to a clipping on June 13.

"Under drought conditions when the crops were approximately 8 inches high, 75% of the available water, about 0.6 inch, was exhausted at the 6 inch depth within 6 days after the soil moisture was at field capacity. In 4 to 6 more days, 75% of the available water, 1.7 inches of water, was used at the 18 inch depth.

Table 1.--Forage crop hay yields from irrigated and unirrigated plots in 1950

Crop	Moisture treatment*	Yields of hay
		tons/acre
Alfalfa	M1	2.97
Alfalfa	M2	2.68
Alfalfa	M3	2.49
Ladino clover	M1	2.55
Ladino clover	M2	2.76
Ladino clover	M3	1.52
Fescue grass	M1	1.89
Fescue grass	M2	1.90
Fescue grass	M3	1.26
Ladino clover-fescue	M1	3.21
Ladino clover-fescue	M2	2.75
Ladino clover-fescue	M3	1.96

*M1 - Irrigated when 75% available water exhausted at 6" depth
M2 - Irrigated when 75% available water exhausted at 18" depth
M3 - Not irrigated"

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**All research work of the Soil Conservation Service is in cooperation with the various State Experiment Stations.

Chemical weed control looks promising - T. L. Copley, Raleigh, North Carolina.-"Corn yields of our surface mulch experiment, revised in 1950 to include chemical weed control treatments, are given in the table below.

Corn Yields Following Different Tillage Treatments

Treatment	Corn after crimson clover, oats, winter cover. (1-year rotation)
	Bu./Ac.
Plowed, clean cultivation	63.6
Subsurfaced, mulch cultivation	65.4
Mulch balk	53.6
2,4D pre-emergence with one lay-by cultivation	68.8
2,4D pre-emergence with 2,4D at lay-by time, no cultivation	70.1

"Yields of corn under mulch continue as good as with clean tillage. Pre-emergence spraying with 2,4D under mulch preparation, followed by one lay-by cultivation was as good or better than complete tillage.

"This was true with two chemical treatments and no cultivation. Observations made during late summer showed there was less volunteer crab grass and weeds in the chemical no-cultivation plot than in any of the cultivated plots. Considerable vegetation volunteered in the other plots following the last cultivation. This experiment was located on a sandy loam soil, and it is assumed that cultivation would be less needed here than on a heavier soil. This point should be studied further since undisturbed surface mulch gives excellent erosion control and would be a "find" if the weeds and grass could be controlled with chemicals.

"Corn yields continue good in kudzu rotations. Apparently, kudzu is an excellent rotation crop for corn, considered from the standpoint of its effect on corn yields. Corn yields of around 90 to 100 bushels were measured following kudzu under heavy fertilization, and yields of around 75 bushels per acre were obtained with moderate fertilization. One plot yielded 104.2 bushels per acre, which was the highest ever measured on any of the station land. Winter oats in the rotation also yield well."

Corn yields from subtillage and plowing as affected by legumes and ammonium nitrates - F. L. Duley, Lincoln, Nebraska.-"A condensed summary showing the effects of legumes, ammonium nitrate, plowing and subtillage on yields and certain plant characteristics will be found in the accompanying table. Another table showing the effect of different legumes grown one year on corn yields also follows. A study of this year's data along with our observations in other years has led to the general conclusion that the slightly greater amount of available nitrogen in plowed land is the principal reason why yields on plowed land are slightly higher in those years when moisture is not a limiting factor. Such was the case this year. At no time during the season did moisture limit the corn crop to any appreciable extent. The yields were therefore pushed up and up with increasing amounts of nitrogen to around or above the 100 bushel per acre figure on both subtilled and plowed land.

"We have experienced some difficulty in getting nodules on roots of lespedeza in sandy soils. T. H. Goodding and T. H. McCalla set up a test in greenhouse to get information on this question. They found that supplying energy material along with inoculation cultures gave some increase. Scarified seed gave more nodules than hulled, and unhulled seed gave fewest nodules. Plants not inoculated gave no nodules when grown in this sand.

"Yields of corn following different legumes grown in 1949 for Soil Conservation

Legume	Yield		Increase due to plowing	Increase due to legumes	
	Subtillage	Plowing		Subtillage	Plowing
Biennial sweet clover (A)	97.0	97.5	0.5	38.8	28.6
Vetch (B)	93.4	99.0	5.6	35.2	30.1
Annual sweet clover (C)	76.2	83.0	6.8	18.0	14.1
Partridge pea (D)	79.1	81.7	2.6	20.9	12.8
Lespedeza (F)	78.3	86.1	7.8	20.1	17.2
Check (E)	58.2	68.9	10.7	-	-
Mean A & B	95.2	98.3	3.1	37.0	29.4
Mean C, D, F	77.8	83.6	5.8	19.6	14.7

"It should be noted that the increase in corn yield from the summer legumes, lespedeza, partridge peas, and annual sweet clover is intermediate between the check (no legume) and the other two legumes, vetch and biennial sweet clover. However, the increase due to legumes is very profitable in all cases and in addition provides good erosion control, especially when the residue is used as a mulch.

"The advantage of plowing over subtillage is 10.7 bushels on the low yielding check plots, but is only 0.5 bushels on the high yielding biennial sweet clover plots."

Favorable effects of rotations where supplemental irrigation is used - O. R. Neal, New Brunswick, New Jersey.-"We have a series of plots on the Vegetable Research Farm where studies are under way on the interrelationships of conservation rotations and supplemental irrigation. Sweet corn is grown under conditions of continuous cultivation and in a 3-year rotation including 2 years of corn and 1 year of a clover-grass sod mixture. In 1950 the yield of sweet corn grown after a grass-legume sod was increased 44% over sweet corn on continuously cultivated sweet corn. This indicates a need for good soil management in order to get maximum benefit from irrigation.

Ammonium nitrate - on corn at Lincoln. Nebraska SCS Experiments. Season 1950. Effects on stalks, suckers and ears.

	Mean - three tests without legume in rotation				Mean - five tests with legume in rotation			
	Subsurface tillage		Plowing		Subsurface tillage		Plowing	
	Ammonium nitrate	No ammonium nitrate	Ammonium nitrate	No ammonium nitrate	Ammonium nitrate	No ammonium nitrate	Ammonium nitrate	No ammonium nitrate
Grain yield - Bushels per acre	78.8	55.9	82.3	62.1	96.2	87.7	100.2	93.9
Stalks per acre	9130	8830	8785	8740	8710	8670	8450	8765
Relative in terms of mean = 8760	104.2	100.8	100.3	99.8	99.4	99.0	96.5	100.1
Suckers per 1000 stalks	383	438	487	423	629	637	706	711
Ears per 1000 stalks	1212	947	1262	1011	1398	1314	1477	1357
Increase due to ammonium nitrate	28.0%	0	25.0%	0	6.4%	0	8.9%	0
Ears per bushel	140	149	135	142	130	126	124	126
Increase in ear size due to ammonium nitrate	6.4%	0	5.2%	0	-3.1%	0	1.6%	0

"Soil and water losses from these areas during the 1950 growing season are shown in the following table:

Effect of rotations and supplemental irrigation on runoff and erosion during the growing season - 1950

Crop	Treatment	Not Irrigated		Irrigated	
		Soil loss lbs./acre	Runoff inches	Soil loss lbs/acre	Runoff inches
Sweet corn	Continuous cultivation	1740	1.82	4560	2.98
Sweet corn	3-yr. rotation Sod 1949	1210	1.06	1220	1.00
Grass-legume sod	3-Yr. rotation Sod 1950	0	0	0	0

"The above data clearly show the value of a rotation in conserving soil and water. Where no irrigation was applied soil losses were 44% higher and water losses 71% higher from continuously cultivated sweet corn. With irrigation soil losses were nearly 4 times as high and water losses 3 times as high from continuous cultivation areas as from areas that had been in sod the previous year. There were no soil or water losses from the grass-legume sod. The increased runoff and erosion from continuous cultivation when irrigated is much higher than was expected. No soil or water losses occurred during irrigation and no storm causing runoff occurred less than 6 days after a water application.

"These results need to be substantiated by further study but were very striking during the past season. It appears that the need for good conservation management of the soil is increased rather than reduced when supplemental irrigation is practiced."

The Effects of Traffic on Soil Physical Properties - George R. Blake, New Brunswick, New Jersey.-"Soil structure is an increasing problem in any intensive cropping system. Forces destructive of structure have become numerous in late years while many persons have not been aware of their accelerated pace. Much work has dealt with the need for regular organic matter additions and inclusion of sod crops in rotation with cultivated crops. Data on the effect of increased traffic of tillage and spray equipment as a deteriorating influence has been almost non-existent.

"Some preliminary data on this problem has been obtained during the 1949 and 1950 seasons. These are shown in Table 1. The traffic variable was attained by sampling in the hill at 4-7" depth and in the furrows having medium and heavy wheel traffic. Furrow samples were surface samples, 1-4" depth, being at a comparable absolute elevation to the 4-7" hill samples.

Table 1.--The effects of traffic on soil physical properties under various rotations.

1, 2 & 3 refer to length of rotations: potatoes, potatoes-wheat (clover), and potatoes-wheat-clover, respectively

Place sampled	% Air space			Volume weight			% Aggregation		
	1	2	3	1	2	3	1	2	3
Hill	24.5	26.1	24.3	1.34	1.37	1.37	68.0	68.1	69.0
Furrows									
Medium traffic	20.1	21.7	21.7	1.39	1.42	1.40	63.1	65.3	66.2
Heavy traffic	10.1	15.0	12.9	1.59	1.60	1.59	60.3	63.5	64.1

"Without exception physical properties are best in the hill and are poor as traffic increases. The differences are rather great. Soil from the furrow having heavy traffic had only 50.7% as much air space, was 8.4% lower in aggregation and 17.1% higher in volume weight than that in the potato hills. These data, together with yield data, suggest that traffic exerts a more dynamic effect on yield and physical properties than do rotation differences. It is probable that rotation effects are largely masked by the cultivation effects.

"It should be noted that air space and aggregation are affected to a greater extent by traffic under continuous potatoes than under the two or three year rotations. This, of course, indicates that there are rotation effects as well as traffic effects on physical properties. Volume weight increases due to traffic are about the same for all rotations.

"The question arises as to whether traffic effects are greater or less due to irrigation. The data in Table 2 elucidate this point.

Table 2.--The interaction of irrigation and traffic on soil physical properties

Place sampled	Percent Air Space		Volume Weight		Percent Aggregation	
	I.	N.I.	I.	N.I.	I.	N.I.
Hill	19.9	30.1	1.37	1.35	66.4	70.2
Furrows:						
Medium traffic	14.9	27.5	1.45	1.38	61.3	68.3
Heavy traffic	8.1	17.3	1.62	1.57	61.2	64.0

"These data indicate that traffic decreases air space and aggregation and increases volume weight about the same amount whether under irrigation or not. If one assumes, however, that there is a critical porosity or a critical volume weight, then traffic may be assumed to be a greater problem under irrigation than under no irrigation. Actually there is considerable evidence that this is true, especially in the case of air space. While 17% air space may not be critical, it is likely that 8.1% air space is actually critical for plant growth.

"A study of aggregation as affected by traffic and irrigation was carried out in 1949, a dry year, when irrigation effects might be important. Since the analyses of these 1949 samples were not previously reported, it seems pertinent to include them in Table 3 for comparison with the 1950 data.

Table 3.--The effects of traffic and of irrigation under various rotations for 1949

	3-Year rotation		2-year rotation		Continuous potatoes	
	I.	N.I.	I.	N.I.	I.	N.I.
Hill:						
0-3"	60.8	72.0	67.6	72.5	65.8	68.2
3-6"	75.3	69.9	73.4	72.2	71.6	69.5
Furrows: 3-6"	59.2	60.8	64.3	65.1	62.7	61.2

"These data for a 1949 sampling show the same destructive effects of traffic on aggregation. The difference in aggregation due to traffic is greater under irrigation than non-irrigation if the 3-6" samples are compared. This is a good indication that the effects of traffic are likely to be more serious under irrigation in a dry year, or in general, in a wet year.

"It should also be noted that there is little difference in aggregation between the 0-3" and 3-6" samples except on irrigated plots. This gives clear indication that irrigation resulted in poorer surface aggregation."

Effect of Contouring and Listing on Soil and Water Losses and Crop Yields - F. W. Schaller, Ames, Iowa.-"The effect of cropping practices on soil and water losses obtained on Ida silt loam at the Western Iowa Experimental Farm in 1950 are presented in the following table:

Cropping System	Runoff	Soil Loss	Yields
	Inches	T/A	Bu./A or T/A
	From Corn		
$C\text{-}O_{scl}$ Surface planted up-and-down hill	5.18	30.64	64.9
$C\text{-}O_{scl}$ Surface planted on the contour	2.34	9.74	61.8
$C\text{-}O_{scl}$ Contour listed	0.14	0.39	65.1
C-O-M-M Contour listed	0.47	0.34	75.0
	From Oats		
$C\text{-}O_{scl}$	3.52	4.78	39.0
$C\text{-}O_{scl}$	3.28	3.33	57.0
$C\text{-}O_{scl}$	3.79	5.65	55.0
C-O-M-M	2.94	3.21	48.7
	From Meadow		
C-O-M-M			
First-year meadow	2.15	1.38	2.82
Second-year meadow**	0.08	0.03	2.98

** Plot damaged by burrowing of gophers.

"Corn grown in a corn-oats$_{scl}$ rotation and planted up-and-down hill lost 30.64 tons per acre during 1950. When corn was planted under the same conditions but contoured the loss was reduced to 9.74 tons per acre. Contour listing of corn further reduced soil losses to a low figure of 0.39 and 0.34 tons per acre respectively for the corn-oats$_{scl}$ and the corn-oats-meadow-meadow rotations. It is recognized, however, that listing on the small plots has probably given greater reduction in soil loss than might be expected under field conditions. On the plot studies listed furrows are exactly on the contour. This is not always possible under field conditions. Also, in 1950 the listed furrows on the plots were rather large and had greater capacity than usually is obtained in the field. The soil loss from oats during 1950 varied from 3.21 to 5.65 tons per acre on the different plots. The soil loss from first-year meadow in a corn-oats-meadow-meadow rotation was 1.38 tons per acre. The second-year meadow in this rotation was damaged by gophers and the results are not reliable.

"The runoff in inches for each treatment shows that, in general, the same treatments which reduced soil loss also reduced runoff but to a smaller degree."

Is the Cost of Applying a Soil Conservation Program on a Farm Justified by Increased Returns? - E. L. Sauer, Urbana, Illinois.-"Fifteen years of farm record studies of the costs and benefits of soil conservation on more than 350 Illinois farms prove that sound conservation programs maintain and improve soil resources, increase farm yields, and boost production and income. These studies are conducted under a cooperative research project between the Illinois Agricultural Experiment Station and the U. S. Soil Conservation Service.

"The average cost, at 1948 prices, of establishing a conservation plan on 48 northeastern Illinois farms was $22.66 an acre. And $11.46 an acre more was required for additional buildings, equipment, machinery and livestock to utilize forage crops produced under the conservation plan. The average total per acre cost of establishing a complete conservation program was therefore $34.12. For the three years 1945-47, 40 farms in this area with conservation plans had an annual net income advantage of $8.27 an acre over 40 physically comparable farms without conservation plans. The average increased returns would have paid the cost of the program in slightly more than four years.

"Ten-year comparisons of matched farms with similar land-use capabilities and size, but with differences in number of soil and water conservation practices, in two Illinois areas show the long-time advantages of following conservation plans. In McLean county, for the 10-year period 1936-45, net farm incomes at 1945 prices averaged $4.78 an acre a year higher on 20 high-conservation farms than on 20 low-conservation farms. The cumulative benefits of a conservation program were shown by the fact that net farm incomes, at 1945 prices, were only $1.15 an acre higher on the 20 high-conservation farms for 1936-37, the first two years of the study, but were $5.18 higher for 1944-45, the last two years of the study.

"In Madison and St. Clair counties, net farm incomes ranged from $3.58 to $9.22 an acre more on 25 high-conservation farms than on 25 physically comparable low-conservation farms, and, when adjusted to the 1945 price level, averaged $7.23 an acre more for the 10-year period of the study, 1939-48.

"Studies of contour farming, contour strip cropping, and terracing showed that the use of these practices resulted in yield increases of 12 percent (7 bushels per acre for corn, 13 percent (2.7 bushels) for soybeans, 16 percent (6.9 bushels) for oats, and 17 percent (3.4 bushels) for wheat. These practices did not increase total farm operating expenses for labor, power, and machinery.

"Illinois bankers who have had experience in making loans for conservation purposes say there is a real need to stress the use of conservation practices in order to conserve our soil resources and to secure continued high production and the highest possible farm income. They feel that it is always good business to invest in conservation and land improvements that will increase farm production and farm efficiency.

"Tenure problems are one of the major 'stumbling blocks' to the adoption of conservation in the corn belt. However, if there is a willingness on the part of both landlord and tenant, satisfactory leasing arrangements can be worked out to achieve a desirable conservation program.

"In each Illinois area studied, production and incomes on the high-conservation farms were relatively better at the end of the period than at the beginning. In most cases an improvement was shown soon after the program started. The present national and world situation calls for long-time high agricultural production. This can be achieved only by widespread adoption of soil and water conservation and fertility improvement programs on American farms."

Lending Policies Regarding Conservation and Improvement Loans - L. J. Norton and E. L. Sauer, Urbana, Illinois."In October 1950 a two-page questionnaire was sent to Illinois bankers and other lenders to determine the practices they followed in making loans for soil conservation and improvement. Onehundred sixteen questionnaires were completed and returned.

"Most of the lenders felt that their farmer customers were interested in building up the long-term productivity of their land but said that less than half of them had fairly complete plans for doing so. Ninety-three percent of the lenders reported making loans for limestone and phosphate; 92 percent for other fertilizer; 80 percent for drainage improvement, terracing, waterways, etc.; a nd 61 percent for construction of dams and farm ponds. Construction of dams and ponds is, of course, not a general practice in the state.

"Approximately 90 percent of the lenders advanced money for construction and improvement of farm buildings and for purchases of livestock needed to use added roughages produced as a result of a conservation program.

"On the average, $73,000 a year was loaned for all of these purposes.

"Of the 116 lenders surveyed, 109 reported very satisfactory experiences with these conservation loans. In general they favor this type of loan. They see the need for conservation and feel that more farmers should be interested in developing sound conservation plans. They point out the importance of 'the man' in this type of loan and also emphasize the need for better working relations between landlords and tenants in order to achieve conservation goals.

"There is wide variation among these lenders in general policies regarding length of loans, security required, and renewal possibilities. In general, if the farmer shows a real interest and is working toward a definite goal, bankers appear willing to lend funds and cooperate in making necessary renewals until the farmer can pay off the loan. Forty-six of the lenders made these loans for one year or less, 12 for one to three years, and 12 for long terms, while 36 had a variable policy depending on the individual and the circumstances.

"Twelve of the lenders had helped to finance a general land improvement scheme, such as a new or improved drainage ditch, during the past five years.

"Eighty-four lenders indicated that they would finance a farmer in a long-term program, even though it would temporarily reduce his cash income (repayment ability), provided the end result would be to increase it in, say, three to five years. Fifteen said they would not make such loans. Their comments indicated that in making such loans they would consider the individual, his problems, and his plan. Some felt that such loans should be handled only by long-term financing, such as a real estate mortgage.

"Forty lenders thought that conservation loans should be set up to provide for advances to cover a complete plan; 32 thought they should be broken down into smaller loans, each to be liquidated before a new loan was made; 23 had variable plans; and 21 expressed no opinion. Again the comments indicate that much depends on the individual farmer, his particular conservation plan and whether he is an owner or a tenant.

"Ninety-three lenders encouraged their farmer customers to have soil tests made by a reliable and competent person, 89 suggested the working out of a full plan by the Soil Conservation Service, 84 encouraged getting general advice about a long-time plan from the farm advisor, and 29 recommended the services of a commercial agency in developing long-term plans. Thirty-eight said they did not encourage the use of commercial services, the thought being that since farmers and others are paying taxes to support educational activities, they should avail themselves of such services as soil testing, etc., provided by educational institutions. (Evidently, they were unaware of the fact that fees are charged for soil testing in the laboratories set up by the county farm bureaus.)

"Eighty-one of the lenders think this is a good time for farmers to invest money in long-time improvements in land or in changed systems of farming, 20 think it is not a good time, and 15 did not reply to this question. Bankers' comments on this question indicate that, while loans for these purposes are desirable, they should be held to reasonable limits, and again much depends on the individual farmer.

"The reasons lenders gave for their answers to this question indicated their real concern about conserving the soil and improving its fertility in order to get efficient high production and optimum farm income. Many felt that there were valid reasons for making such improvements now, and a considerable number felt that it was always good business to invest in improvements that would increase farm production and efficiency.

"Approximately 20 percent of the replies indicated that costs were too high, times too uncertain, etc., to invest in long-time land improvements now. Many of those favoring such investments pointed out the desirability of increasing production and efficiency on present holdings rather than investing in additional acreage at present high land prices."

DRAINAGE AND WATER CONTROL DIVISION

Hydrologic Studies - L. L. Harrold, North Appalachian Experimental Watershed, Coshocton, Ohio.-"Precipitation for the month totaled 3.90 inches, about 1 inch of which fell as snow. Rains of January 2-4 (1.3 inches) and 14-15 (1.1 inches fell on wet and unfrozen soil. Intensities were low. Most of this rain was absorbed by the soil on the lysimeters. As the moisture content of the soil profile was above field capacity, the infiltration resulted in increased percolation. The increase for the January 2-7 period was about 1.3 inches - equal to the amount of rainfall for the same period. Percolation increase for the January 15-18 period was about 0.8 inch - a little less than the rainfall.

Wherever this percolation water formed water tables near the soil surface, springs and seeps flowed freely. Most of the stream flow for the month was comprised of such flow.

"January 15-17 L. L. Harrold attended the Annual Meeting of the Ontario Crop Improvement Association in Toronto, Canada. He addressed the convention on the subject of 'Water Requirements of Crops and Available Moisture Supplies.' A 20-minute question and answer period followed the address.

"During the week of January 22, L. L. Harrold conferred with Research Project Supervisors in Region 3, outside of Ohio, on the adequacy of current and past research, status of analysis, and future needs to meet the requirements of the Service Water Conservation Program. On January 22-23 he met Hickok, Van Doren, and Welton in Lafayette, Ind.; January 24, D. D. Smith in McCredie, Mo.; January 25, Schaller, Mendell, Pierre, and Frevert in Ames, Iowa; and on January 26, Hayes, Minshall, and Bay in Madison, Wis.

"During the period January 29-February 1, L. L. Harrold discussed with men in the Regional Office some of the findings of the week before when he met with Research Supervisors. On January 29 and 30, he and O. E. Hayes met with von Trebra, Paschall, and Jacobson - Operations representatives on the Regional Research Committee. The objectives of this committee and plans for carrying out the objectives were discussed and outlined."

Hydrologic Studies - J. A. Allis, Central Great Plains Experimental Watershed, Hastings, Nebraska.-"Temperatures and precipitation for January 1951 were practically normal with a mean daily temperature of 23° F. and a total of 0.40 inch of precipitation.

"During the month the peak rates of discharge were tabulated on all the single-crop watersheds containing approximately 4 acres each. It was interesting to note that all but one of the seven corn watersheds peaked on July 17 and that all the seven oat watersheds peaked on September 19. The seven wheat watersheds peaked on three different dates during the year. In other words this indicates, as has been our past observations, that cover is the primary factor influencing peak rates of discharge. In July the corn offered less protection to the land than did the oats while in September the reverse was true.

"Following are the average maximum peak rates of discharge for the year:

Table 1.--Average maximum peak rates of runoff from 4-acre watersheds in inches per hour, 1950

	Corn	Oats	Wheat
Straight row	3.34	3.29	2.92
Contoured	2.23	1.80	1.70
Subtilled	2.62	2.67	1.94

"The average maximum peak rates of runoff for 10 storms producing the highest peaks for 1950 are as follows:

Table 2.--Average maximum peak rates of runoff for 10 storms during 1950 in inches per hour

	Corn	Oats	Wheat
Straight row	1.56	1.33	1.58
Contoured	.83	.77	.92
Subtilled	.99	.97	.89

"The average total runoff from pasture land under different treatment show the following comparison for 1950: The total rainfall at the Central Meteorological Station was 22.44 inches for the year."

Table 3.--Average total runoff from pasture plots containing 0.69 acre, in inches for the year 1950

Untreated-check plot	1.43 inches
Eccentric Disk	.91 inch
Furrowed 12-18'	.29 inch
Furrowed 4-5'	.21

Hydrologic Studies - R. B. Hickok, Lafayette, Indiana.-"The year 1950 ended with a month of sub-normal precipitation (and temperatures), but the year as a whole was about 30 percent over the average annual rainfall for Lafayette. The year 1951 starts off with January precipitation significantly below 'normal.'

"There were several periods of low runoff during December and January, contributed to by thawing snow. There is apparently little significance in comparison of the runoffs with respect to the types of cover and treatment of the watersheds.

"The weather this winter has provided a welcome relief so far, from the extreme difficulty experienced during the two previous winters in keeping the runoff measuring and sampling equipment cleared of ice and operating through extended periods of alternate freezing and thawing. Good progress has been made this winter in catching up with compilations of accumulated data.

"A detailed study by Mr. Stoltenberg of the data for the past 5 years has revealed the erosion losses from the experimental watersheds while under meadow cover to have been relatively very low; and that the concentrations of eroded material in their runoff were surprisingly uniform, irrespective of the age of meadow, type soil management practices, etc.

"In view of these findings, it has been decided that sampling and analysis of the runoff should be suspended during the periods the watersheds are in meadow and the erosion losses for those periods estimated on the basis of the measured runoff and the mean concentrations of eroded materials from the past determinations. This procedure will substantially reduce both field and laboratory work and permit needed increased concentration on other phases of the watershed studies.

"The following table summarizes the 1950 corn yield data for the mulch tillage plots:

Table 1.--1950 corn yields, mulch tillage experimental plots, Purdue-Throckmorton Farm, Lafayette, Ind., and Noble County Farm, Albion, Ind.

Treatment No.	Residue location	Depth of tillage in inches	Implements used	Bushels per acre, 17% moisture	
				Throckmorton farm	Noble County farm
1	Surface	7, Strip only	Spring tooth field cultivator (strip only)	50	58
2	Surface	3	Sweeps	58	66
3	Surface	3 and 7	Sweeps	52	65
4	Mixed 0-3"	3	Disc harrow	68	62
5	Mixed 0-3"	7	Special plow and Disc harrow	73	65
6	Mixed 0-6"	6	Cover crop disc[3]	73	69
7	Under 4-7"	7	Moldboard plow	68	65
8	Mixed 0-3"	7	Plow 1-1/2" in fall Spring same as #5	72	70

1. L. S. D. 5% Noble County Treatment - 8
2. L. S. D. 5% Throckmorton Farm - 12
3. Plowed 3" before cover crop disc was used.

"It is interesting to note that on the Throckmorton Farm four of the experimental mulch treatments equaled or exceeded the plowed plots in yields this year. Two of the same mulch treatments exceeded the plow treatment in yield at this location in 1949. However, the 6-year averages indicate considerable yield advantage for the plow treatment at Lafayette. (No. 8 treatment has been run only last 2 years)

"At Albion, the plow treatment was equaled or exceeded in yield by four of the mulch treatments this year. At this location, the mulch treatments have been pretty consistently competitive with the plowing method on yields, with a slight margin for the No. 5 treatment for the 6 years of the experiment. Mr. Wilbur Croin, of the Station Staff, has pointed out from analysis of the data for the 6-year period, that the No. 5 treatment at Albion has produced the most consistent yields from year-to-year of any of the treatments and has considerable advantage over some of the other methods from the standpoint of ease of accomplishment. The deep tillage combined with shallow mixing of the residues into the soil can be done with either a heavy field cultivator or the 'TNT' type plow operated with the top shear about 3 inches deep, followed by a disc harrow. Planting and cultivatic have been relatively easy with this type of seed bed and mulch preparation.

Hydrologic Studies - A. W. Cooper, Auburn, Alabama.-"It's been a busy month at Project AL-R-3. Before we could get over the holiday blues, all hands were working like mad to assemble infiltration, available water-holding capacity, permeability, and mechanical analyses data by January 8.

"The week beginning that date the Auburn staff met in the State Office with C. M. Sanders, Drainage Engineer, Demopolis; M. E. Stephens, State Soil Scientist, F. T. Ritchie, Survey Supervisor, Montgomery; and G. M. Renfro, Regional Irrigation Engineer, Spartanburg. In 4 days the infiltration data obtained last year were digested well enough to report, and a rough copy of Progress Report No. 1 - Physical Properties of Alabama Soils for Conservation Irrigation, June 15 to December 31, 1950, was completed.

"The trip to the Mississippi Delta was made with Messrs. C. M. Sanders, Drainage Engineer, A. Carnes, Regional Engineer, J. L. Aull, Zone Engineer, and Harold Estes, Drainage Engineer in the Delta of Mississippi. It was an interesting as well as instructive trip. Mr. Estes showed us representative examples of row lay-out for drainage of cotton land in the Mississippi Delta. We studied this work from Yazoo City as far north as Clarksdale.

"The standard practice in this section in the past has been to make straight rows parallel to a land line without regard to soil loss. And they do get soil loss even in the relatively flat sections as well as drowning of the crops in pockets.

"We observed practices introduced by the Service to remedy some of these conditions and not interfere with the operation of four-row equipment.

"On fields with even long slopes, 0 to 2 percent, a guide row (one of the longest rows in the field) is laid out with a general grade of 0.2 to 0.4 of a foot per 100 feet. These rows drain at intervals into W-type ditches, which are located in the small wide depressions occurring in the field. The average length of drainage in a row is some 400 feet, although the rows may be a mile to a mile and one-half long. The row may run parallel or at an angle to the ridge. When the row direction must change to prevent excessive grade and the curve is too sharp for machinery operation, an area is left out of production and is used for an access road to the field. In that area a change in soil type or a change in slope serves as an index for locating the guide row.

"After observing this work, we believe the principles as used in Mississippi can be used on the flat lands of the lower coastal plains and on some of the river terrace soils of Alabama used for row crops.

"Mr. Carter completed mechanical analyses on five soils. These values are reported in table 1, which appears on the next page."

Hydrologic Studies - L. H. Stolzy, East Lansing, Michigan.-"The January precipitation as measured by the U. S. Weather Bureau type of standard nonrecording rain gages, amounted to 2.45 inches at the cultivated watersheds, 2.85 inches at the wooded watershed, and 2.36 inches at the stubble-mulch plots. These amounts are approximately 135 percent, 157 percent, and 130 percent, respectively, of the 50-year average January precipitation of 1.82 inches. January precipitation can be expected to equal or exceed 1.82 inches once in 2.20 years.

"Both watersheds contained frost at the beginning of the month of January. Watershed 'A' had a frost layer from 0-3 inches and watershed 'B,' from 0-6 inches on

Table 1.--Mechanical analyses of Alabama soils*

Particle Size	Particle Description	Hartselle - Depth 1"-4"	14"-17"	21"-24"
		Corrected average		
Mm.		Percent		
4-2	Gravel	10.13	14.16	6.37
2-1	Fine gravel	.17	.16	.23
1-0.5	Coarse sand	.76	.70	.61
0.5- .25	Medium sand	4.48	3.98	4.30
.25- .1	Fine sand	19.25	17.38	14.83
.1- .05	Very fine sand	18.21	15.60	17.91
.05- .005	Silt	30.57	33.92	21.03
<.005	Clay	16.43	14.10	34.72
	TOTAL	100.00	100.00	100.00

Particle Size	Particle Description	Vaiden - Depth 1"-4"	9"-12"
		Corrected average	
Mm.		Percent	
4-2	Gravel	0.00	0.00
2-1	Fine gravel	.55	.53
1-0.5	Coarse sand	2.11	1.76
0.5- .25	Medium sand	10.31	8.61
.25- .1	Fine sand	34.53	29.63
.1- .05	Very fine sand	10.73	11.51
.05- .005	Silt	26.91	22.55
<.005	Clay	14.86	25.41
	TOTAL	100.00	100.00

Particle Size	Particle Description	Akron - Depth 1"-4"	4"-7"	11"-14"
		Corrected average		
Mm.		Percent		
4-2	Gravel	0.00	0.00	0.00
2-1	Fine gravel	.05	.00	.00
1-0.5	Coarse sand	1.58	1.40	1.44
0.5- .25	Medium sand	11.45	8.60	9.11
.25- .1	Fine sand	48.15	24.82	25.25
.1- .05	Very fine sand	8.74	12.08	10.51
.05- .005	Silt	8.83	12.08	12.76
<.005	Clay	21.20	41.02	40.93
	TOTAL	100.00	100.00	100.00

*Data obtained jointly by SCS Research and Operations.
Textural classification as determined by mechanical analysis:
Hartselle: Fine sandy loam - 1"-4", 14"-17"; sandy clay loam - 21"-24".
Vaiden: Fine sandy loam - 1"-4"; sandy clay loam - 9"-12".
Akron: Fine sandy clay loam - 1"-4"; sandy clay - 4"-7", 11"-14".

Table 1.--Mechanical analyses of Alabama soils*--Cont.

Particle Size	Particle Description	Madison - Depth 0"-3"	6"-9"	12"-15"	18"-21"
		Corrected average			
Mm.		Percent			
4-2	Gravel	7.21	2.03	0.00	0.00
2-1	Fine gravel	2.37	2.94	2.38	1.90
1-0.5	Coarse sand	10.00	8.24	7.91	7.16
0.5- .25	Medium sand	8.90	6.10	4.11	4.10
.25- .1	Fine sand	16.95	10.63	11.24	12.62
.1- .05	Very fine sand	14.99	12.49	14.93	13.19
.05- .005	Silt	12.81	18.37	11.21	17.17
<.005	Clay	26.77	39.20	48.22	43.86
	TOTAL	100.00	100.00	100.00	100.00

Particle Size	Particle Description	Allen - Depth 1"-4"	7"-10"	17"-20"
			Corrected average	
Mm.			Percent	
4-2	Gravel	3.69	1.86	1.23
2-1	Fine gravel	1.02	.93	.93
1-0.5	Coarse sand	1.52	1.35	1.33
0.5- .25	Medium sand	2.53	2.16	1.99
.25- .1	Fine sand	7.32	5.27	6.27
.1- .05	Very fine sand	15.42	15.20	14.34
.05- .005	Silt	41.42	40.19	32.81
<.005	Clay	27.08	33.04	41.10
	TOTAL	100.00	100.00	100.00

*Data obtained jointly by SCS Research and Operations.

Textural classification as determined by mechanical analysis:
Madison: Sandy clay loam - 0"-3"; clay loam - 6"-9"; clay - 12"-15" 18"-21".
Allen: Loam - 1"-4"; clay loam -7"-10"; clay - 17"-20".

January 1. On the 2d, due to the precipitation in the form of rain the frost left the ground enough to allow some of the precipitation to infiltrate. On January 8 we again had frozen conditions in the soil which reached the 6-9 inch profile layer by January 13. This caused the runoff on January 20. The soil remained frozen throughout the rest of the month.

"There were five runoffs during the month of January at the cultivated watersheds- one runoff at watershed 'A' and three runoffs at watershed 'B'. The five runoffs were small in intensity and amounts and in most cases filled the silt basin with a trace of soil present. Due to the rains of January 2 and 3, all the snow accumulation on the ground was melted and ran off with the rains. Snow again covered the ground to a depth of 2.3 inches on the 15th which, added to the rains that ran off on the 20th, left the ground bare. We had several more light snows after the 20th which covered the ground with approximately 5 inches of snow. There was a trace of runoff at the wooded watershed on January 20, 1951.

"On January 3 and 4 some of the members of the National Highway Research Board, Messrs. Miller and Thomas from Dow Chemical Company; Messrs, Mathews, Stokstad, and Gordon from State Highway, Soil Engineers; and Mr. Finney, Assistant Testing and Research Engineer of the Michigan State Highway Department, contacted the Research Station in person for the express purpose of getting temperature and frost penetration data. These data are greatly needed to study the effects of soil temperature (freezing and thawing) under black-top surfaces used for highways and air fields. These data are also invaluable in studying the effects of temperature on pipe line construction, of which Dow Chemical has hundreds of miles.

"On January 31 Mr. Arthur Wolcott of the Upper Peninsula Experiment Station at Chatham, Mich., called on the Research Station at Director Hardin's suggestion. He was primarily interested in the methods of taking temperature and humidity data which could be used in forecasting warnings to the farmers of the possibility of potato blight. We reviewed the different ways and the way we are at present collecting these data. Mr. Wolcott will get in touch with us again in the spring."

Hydrologic Studies - T. W. Edminster, Blacksburg, Virginia.-"Messrs. Weir, Patten, Warner, and Wilson met at Blacksburg with Messrs. Holtan and Kirkpatrick in discussing and planning the application of the method for estimating runoff as suggested by Holtan and Kirkpatrick. Analysis of published data available indicates that the detention-discharge relationship for large watersheds is affected by changes in gradient and changes in the flood plain of the main stream. Plans were made to obtain cross sections, gradients, etc., on the main streams of some of the watersheds under consideration by Flood Control near Staunton, Va. These data together with aerial photos and the stereoscope will be used to estimate detention-discharge relationships for the main channels. Inflow to the main channel will be estimated as runoff from smaller areas for which applicable detention-discharge relationship curves are on file. The above conferees as well as Messrs. Devereux and Steele who were contacted later feel that stereoscopic aerial photos would give good indications of the flood plains on the main channel.

"The project personnel met with Mr. V. R. Hillman, Virginia State Soil Conservation Committee, to discuss and help in the preparation of preliminary specifications for constructing earth dams across inlets on the Eastern Shore. These dams are for the purpose of ponding water for irrigation use. Final specifications will be held up until the field inspection trip can be completed."

Runoff Studies - N. E. Minshall, Madison, Wisconsin.-"Precipitation at Fennimore for the month was 0.90 inch, all in the form of snow. Temperatures varied from a maximum of 45 degrees on the 17th to a minimum of 29 below on the 30th, with a mean for the month of 13 degrees or 4 degrees below normal. There is perhaps more than a foot of snow on the ground and very little frost.

"At Edwardsville, precipitation for the month was 1.43 inches or about 1 inch below normal. Most of this precipitation was in the form of rain or sleet and all at low rates with a very small amount of surface runoff. Temperatures varied from a maximum of 71 degrees on the 18th to a minimum of 5 degrees below on the 29th, with a mean for the month slightly above normal."

Hydraulic Studies - F. W. Blaisdell, Minneapolis, Minnesota.-"The preparation of the reports on box inlet drop spillways progressed at a satisfactory pace during the month. The design report was dictated and revised, with the exception of a section giving a typical solution, and the semi-final rough draft copy was being typed at the end of January. Copies of this rough draft will be submitted to a couple of Operations people for their suggestions prior to the final revision. The research report was revised and is awaiting typing of the semi-final draft. Many of the figures have been drafted and it is anticipated that this task will required approximately 1-1/2 weeks additional time to complete.

"Tests on the drop inlet spillway with a pipe conduit were resumed and analysis of the data for one model test was well along at the end of the month. This work is being carried out by a student who is devoting half-time to the study. The pipe in this model has a slope of 30 percent and the square edged pipe entrance is at the bottom of a riser 1.25 D square by 2 D deep. The important qualitative finding to date is that the pipe may not fill until the depth over the crest of the riser is in the neighborhood of 3.2 D. This means that much of the available storage space in the reservoir may be taken up before the barrel begins to flow full. The result is danger of over-topping the fill if the short riser is used and the pipe is designed to flow full.

"Mr. Donnelly spent a few days planning the details of the test set-up for the cantilevered pipe outlet study and then began to revise the experimental set-up. Such revisions as have been completed can be used for either the cantilevered outlet study or the straight drop spillway study. Further revisions of this set-up must await a determination as to whether or not Mr. Donnelly will conduct the straight drop spillway study at this location. If someone is to be detailed to conduct the straight drop spillway study, Mr. Donnelly will conduct the cantilevere study there and another location will be provided for the drop spillway study."

Drainage Studies - M. H. Gallatin, Homestead, Florida.-"We have had a steady decline in the water table for the area during the period. For the Redland Profile losses ranged from 0.72 foot at the northern end of the area to 1.04 feet at well No. 4 south of the intersection of Mowry and Redland roads. For this same period a year ago losses ranged from 0.56 foot at well No. 1 at the south end to 0.95 foot at the north end.

"For the Mowry Street Profile losses ranged from 1.78 inches at the western end to 0.70 inch at the eastern end. For the same period a year ago losses were somewhat less with 0.97 foot on the west to 0.45 at the eastern end.

"For the Eureka Profile during this period losses were somewhat less than for a year ago. This year the losses ranged from 0.6 at the western end to 0.76 at the eastern end against 0.82 to 1.01 inches a year ago.

"Readings at well No. 5, corner of Mowry and Redland show that our water table is about the same as it has been during previous years. Daily readings indicate that losses run from 0.03 to 0.06 foot. The readings for this well for the past 5 years on January 31, were as follows:

January 31, 1951	1.96 M. S. L.
1950	1.96
1949	1.97
1948	3.51
1947	1.92
1946	1.81

"For the Everglades Profile it will be noted from the tables below that we had less loss in water table during this period this year than for the same period a year ago. It will also be noted that we had a somewhat higher water table a year ago but ended the period with a lower water table than we had this year. I believe this is due to better control of our coastal structures.

Location	1/4/51	2/5/51	Loss
Trail and Krome	6.49	6.31	-.18
Bird Road	6.36	6.13	-.23
Staff Gage	6.09	5.97	-.12
G-25	5.86	5.67	-.19
G-24	5.52	5.44	-.08
G-23	4.92	4.60	-.32
	1/5/50	2/14/50	Loss
	6.92	6.25	-.67
	6.89	6.21	-.68
	6.79	5.74	-1.05
	6.54	5.34	-1.20
	6.27	4.99	-1.26
	5.59	4.30	-1.26

"There has been a steady increase in the readings in the natural cover and check plots with little or no increase in the readings for the shavings plot and a slow increase in the readings for the pine straw and grass mulched areas. Over the period of operation of these plots it is quite apparent that the grass and pine straw mulched areas are somewhat better material than shavings. Inspection of the shavings material shows that deterioration is taking place but up to the present time analysis for nitrates shows that there has been no release of nitrates while there has been an appreciable release in the grass and pine straw mulched areas.

"In general, readings of the blocks in our lime plots scattered throughout the area increased quite rapidly during this period and the wilting point was reached quite early in the month. In the avocado blocks readings increased slowly but had not reached the wilting point at the end of the same period.

"Work in our moisture-irigation plot was continued during the period. As I have stated previously we are using the new direct reading moisture meter developed by Dr. George Bouyoucos in conjunction with the older equipment. So far this new

equipment shows promise. Readings of the two follow closely. For the present from past work, it seems that water should be applied when the moisture level falls to 20-25 percent. We are following this at least for the present in this new plot area.

"There has been no loss of nitrates due to leaching during this period. We started during the past period a new series of plots in our nitrate leaching studies. This work is in cooperation with one of the grove caretakers. We shall carry the leaching studies and the cooperator will keep records as to growth and yield of the various areas. Our past work has been more or less general and while we have obtained a lot of good basic information this new work where all phases are considered should tie up and answer many questions.

"Much of the marginal coastal area where crops were grown last year could not be used this year. Samples collected this year from these areas substantiate previous recommendations that areas should not be planted if there is 1,000 p. p. m. or over of chlorides at the time of planting. This is for such crops as tomatoes, potatoes, and deep rooted crops. For bush beans and pole beans the concentration should not be over 400 - 500 p. p. m. at the time of planting.

"Collection of tolerance samples has been continued at 2-week intervals. While we do not have time to analyze these at present they should add materially to our present information and will be reported on later this year."

Drainage Studies - E. G. Diseker, Raleigh, North Carolina.-"The writer attended the Association of Southern Agricultural Workers which met in Memphis, Tenn., February 5, 6, 7, and presented a paper on the subject of 'Open Ditch Drainage in North Carolina.' Due to the limited time for clearing the paper through different cooperating agencies before presentation, the writer decided to release only the abstract, which had cleared the cooperating agencies, to the ASAW officials."

Drainage Studies - C. B. Gay, Fleming, Georgia.-"A paper entitled 'Drainage and Use of Soils Along the South Atlantic Coast' was prepared for presentation at the ASAW meeting in Memphis February 5-7."

Drainage Studies - T. W. Edminster, Blacksburg, Virginia.-"Mr. Walter Turner reports that the major portion of the month was spent in review of existing permeability data. Considerable effort was put into the preparation and correction of the soil mapping codes for each of the sites that have been sampled. It is hoped that by the end of February his analysis of the status of the permeability work will be to a sufficient point to put into effect the revised operating procedures which will speed up and facilitate the work during the coming year.

"Mr. Walker completed the preparation of a paper entitled 'Techniques of Drainage Research in Virginia -- Typical of the Southeast' for presentation at the ASAW meeting."

Sedimentation Studies - Russell Woodburn, State College, Mississippi.-"During the first week in January. Mr. James B. Burford and the Project Supervisor spent 2 days in the field with Mr. L. C. Carter, Survey Supervisor, Flood Control Staff at New Albany in search for and studying reservoirs suitable for sedimentation investigations.

"For 2 weeks, beginning January 8, 1951, Mr. L. C. Gottschalk of the Washington Office and Mr. John W. Roehl of the Regional Office worked with the local research staff and representatives of the Flood Control office on final plans for the

sedimentation investigations. During the course of these field studies, it was decided to limit the preliminary scope of the investigation to the rougher part of the sand clay hills and to the brown loam soil provinces. The surface soil is near enough the same over these areas that the same sheet erosion rates may be used for the entire watershed affected. Gully erosion will have to be added as a separate factor and may be rather considerable above many of the reservoirs. Field work began on the actual surveys January 15 and aside from minor weather interruptions proceeded until January 26. A very serious cold wave with accompanying ice blanketed the entire area on January 29 and the field work was closed for the remainder of the month and very probably for the first week in February.

Sedimentation Studies - L. M. Glymph, Jr., Lincoln, Nebraska.-"Several days in the first half of the month were spent completing revision of a paper tentatively titled 'Relation of Sedimentation to Accelerated Erosion in the Missouri River Basin.'

"Upon request of Region 5, most of the last half of the month was spent working with Water Conservation Division personnel and representatives of the Army Engineers, Omaha District, on sedimentation aspects of the Salt-Wahoo watershed survey. The two agencies, The Soil Conservation Service and The Crops of Engineers, are making surveys of this watershed to plan a set of coordinated recommendations for flood control. Development of rates of sediment production for various subwatersheds and estimates of the effects of conservation measures and watershed treatments upon sediment production is an important part of the total survey job. This information is required by both the Army and the Soil Conservation Service as a basis for damage and benefit computations and also in connection with design of contemplated flood detention reservoirs.

"Only very limited data on rates of sediment production are available for the Salt-Wahoo watershed. It is necessary therefore to devise some means for estimating rates from information on watershed characteristics. Considerable progress was made along this line and it appears that the techniques being developed will be applicable in many other watersheds.

"As pointed out, I have spent most of the last half of the month working with the Region on the Salt-Wahoo watershed survey. This survey as you know is being closely integrated with one under way concurrently by the Army Engineers. Particular effort is being made to integrate these activities all along the line and the techniques and technical adequacy of methodology of each Agency are being studied in some considerable detail.

"I was requested to sit in on a conference here in Lincoln between Regional and Army sedimentation men on January 16. From this conference, it was readily apparent that the Service needed to firm up its sedimentation data, particularly in respect to the estimated effects of the program in reducing rates of sediment production. This of course has a considerable bearing on the economic benefits from watershed treatments and it bears directly upon engineering design of some flood detention reservoirs contemplated by the Army. So it becomes a rather fundamental question.

"In getting at a solution of this problem we are working toward further development of the relationships between sediment production and watershed characteristics. I think we can make our point so far as current cooperation with the Army is concerned if we can show conclusively the relationship between rates of sediment production and rates of watershed erosion. In general the approach so far

has been to adapt the work of Gottschalk and Brune in the Missouri Basin Loess Hills to Salt-Wahoo conditions. We are finding, however, a needed for additional statistical analysis and some more basic data for larger watersheds to follow this through. These items are being taken care of."

IRRIGATION AND WATER CONSERVATION DIVISION

Drainage Studies, San Fernando Valley Soil Conservation District - W. W. Donnan, Los Angeles, California.-"The manuscript of a final report on 'Ground Water and Drainage Investigations in San Fernando Valley' has been completed for reproduction. The evidence and data produced by this investigation shows that the nature and extent of the drainage problem involves the following:

"(1) The high water table is a recurring one coincident with rainfall cycles. High water tables have been a problem from time to time since the early nineteen-twenties.

"(2) This latest high ground-water problem has been the result of the 1937-44 extreme wet period.

"(3) Chatsworth and other reservoirs do not appear to have any material effect on the water table or its fluctuations.

"(4) Since 1925 pumping for farm irrigation in the area west of Sepulveda Boulevard has not exceeded 3,000 acre-feet. In 1950 it was about 1,200 acre-feet. It appears that pumping for farm irrigation in the western half of the Valley has only a minor effect on the water table.

"(5) Over-irrigation of farm lands may have significant localized effect on the water-table problem but only has a minor effect on the valley-wide problem.

"(6) The acute problem area in the Soil Conservation District centers around known artesian or semi-artesian wells.

"(7) These wells have their source of water pressure in the 100 to 300-foot deep aquifers overlaid by clays and clay loams.

"(8) The water table has not diminished appreciably in these areas and down slope from the artesian wells during the past three extremely dry years.

"(9)The leaking artesian wells are the primary cause of the high water table in the western half of the valley since 1944."

Water Conservation Studies, Tehachapi Valley Soil Conservation District G. M. Litz, Los Angeles, California.-"In connection with the cooperative water-supply study of the Tehachapi Soil Conservation District, a map was completed showing the ground-water contours in the Cummings and Brite valleys for October, 1950. These October elevations were measured after nearly all pumping for irrigation had been stopped for several weeks. This map shows a rise in the water-table over the central portion of Cummings Valley, when compared with the California Division of Water Resources map showing the ground-water contours for June 1950, when there was heavy pumping for irrigation in this area."

Soil-Moisture Characteristics - V. S. Aronovici, Pomona, California.-A soil map was completed for the San Timoteo ground-water basin of the Upper Santa Ana Investigations."

Evaporation, Salton Sea- Imperial Valley - George B. Bradshaw and William T. Gish, Imperial, California.-"The third year has been completed on the Salton Sea evaporation study. The objective of this study is to determine the amount of storage available for drainage water inflow to the Salton Sea without flooding farm lands. Since the sea is a closed basin and is the only outlet for drainage waste the maintenance of the Salton Sea at a safe level becomes a problem in the over-all drainage of the Coachella and Imperial valleys. Three evaporation stations have been maintained at the request of the Imperial Irrigation District for the past 3 years: (Sandy Beach on the west side; (2) Devils Hole on the north end, and (3) Salt Farm on the east side.

"The following table gives the annual evaporation from a 2-foot diameter Arthur Young type screen pan for 1948-50 and the monthly evaporation during 1950, at the three stations.

Year	Evaporation from screen pans, Salton Sea		
	Sandy Beach No. 1	Devils Hole No. 2	Salt Farm No. 3
	Inches	Inches	Inches
1948	121.57	99.36	94.73
1949	114.44	96.13	90.02
1950	112.44	91.25	88.60
Month 1950			
January	4.35	3.06	2.99
February	3.71	3.30	3.03
March	8.64	6.13	5.91
April	9.93	8.19	7.77
May	11.00	10.03	9.92
June	14.26	11.30	10.78
July	13.02	10.66	10.43
August	15.37	12.31	12.00
September	12.85	10.02	9.57
October	8.88	7.05	6.76
November	6.11	5.38	5.49
December	4.32	3.82	3.95

Consumptive Use and Irrigation Requirements, New Mexico - H. F. Blaney, Los Angeles, California.-"A manuscript on Consumptive Use and Irrigation Water Requirement of Crops in New Mexico was completed by Harry F. Blaney, Eldon G. Hanson, and G. Marvin Litz, in cooperation with the New Mexico Agricultural Experiment Station and the Operations Division of Region 6. The purpose of this report is to outline a method of computing consumptive use and irrigation requirements for irrigated lands where few or no data, except climatological, are available. Estimates of normal consumptive use and net amounts of irrigation water necessary to satisfy consumprive use requirements for each of the major crops in 26 irrigated areas of New Mexico are presented in this report. Water requirements are given in the report for alfalfa, pasture, grass-hay, deciduous orchard, spring grain, sorghum, corn, cotton, beans and vegetable crops. Examples of normal rates of consumptive use for spring grain, sorghum and corn are shown in the following tabulation:

Location	Spring grain		Sorghum		Corn	
	Growing season	Consumptive use	Growing season	Consumptive use	Growing season	Consumptive use
	Dates	Inches	Dates	Inches	Dates	Inches
Animas Valley	3/30-6/30	13.4	5/1 - 10/1	24.5	5/10-9/15	22.4
Albuquerque	4/1 -7/10	14.2	5/1 - 9/20	22.1	5/1 -8/31	20.9
Socorro	4/1 -7/15	15.6	5/15-9/20	20.4	5/1 -8/31	21.3
Guadalupe County	4/10-7/10	13.7	6/1 -9/20	18.2	5/15-9/15	21.2
Tucumcari	4/1 -7/15	15.6	5/1 -9/30	24.5	5/1 -8/31	21.8

Seepage Losses from Irrigation Channels - C. Rohwer, Ft. Collins, Colorado.-"The results of the observations on seepage at the seepage rings at the Horticultural Plot and Bellvue Laboratory have been computed and checked. They are now being plotted. Mr. Robinson has analyzed the results of the tests of the effect of depth on seepage from the seepage rings. The tests show that there is very little increase in seepage as the depth increases. This is shown by the tests on heavy soil at the Horticultural Plot and on sandy soil at the Bellvue Laboratory. Furthermore, the seepage rates in the widely different soils are nearly the same for comparable depths. The small effect of depth on the seepage rate was noted last year. Very consistent results were obtained this year and since the tests on the two soils were made by different observers it must be concluded that the depth does not have much effect."

Irrigation Studies - P. E. Ross, Weslaco, Texas.-"Probably the most disastrous freeze in 50 years is occurring in the Lower Rio Grande Valley of Texas at the time this report is being written. Temperatures have been below freezing for 3 days and are expected to reach a minimum of 15° F. before the thaw begins. The range in temperature has been from 20° F. to 29° F. for the 72-hour period and the general concensus is that much damage has been done to the citrus trees. An appraisal of the final damage cannot of course be made for some time after the thaw occurs."

Irrigation Studies - D. W. Bloodgood, Austin, Texas.-"It will be noted from the accompanying table that the capacity of the pumping plants range from 300 to 1,200 g. p. m. The quality of water is very good for the Trans-Pecos Area. The total dissolved solids range from 353 to 495 p. p. m. Usually the best water in the area has been about 1,400 p. p. m. for waters of the Balmorhea and Fort Stockton area. The only other section in the area having similar irrigation water is in the artesian wells of Alamite Creek which is about 35 miles south of Marfa. The total dissolved solids of these wells range from 293 to 310 p. p. m. Lobe Station Area is approximately 100 miles further to the north from the artesian wells and is located in a different valley. The irrigation waters of the Trans-Pecos area (well and stream flow) range from 2,300 to 6,000 p. p. m. These waters are considered good and are producing good cotton and alfalfa crops."

4/5/51

Table 1.--Well data and chemical analyses of waters in Culberson County, Tex. (Lobo Station area)

Location	Owner	Water bearing material	Well data: Depth	Well data: Pump discharge	Chemical analyses of water: Total dissolved solids	Sulphates (SO_4)	Calcium (Ca)	Magnesium (Mg)	Carbonates (ECO_3)	Sodium and Potassium (NA+K)	Chloride (Cl)	Sodium Percentage	Nitrate (NO_3)	(SlO_2)	Remarks
			Ft.	Gpm.	Ppm.	Ppm.	Ppm.	Ppm.	Ppm.	Ppm.	Ppm.		Ppm.		
5 mi. S. of Lobo Sta.	Van Horn Irrig. farms	Bolsom Sands	375	800	353	44			205	87(Na)	16	77	5.1	64	5/4/50 sampled after pumping several days
1.2 mi. E. of Lobo Sta.	Ray Landreth	Bolsom Sands	380	700	363	48			211	88(Na)	16	77	5.8	65	same as above
1.7 mi. E. of Lobo Sta.	Ray Landreth	Bolsom Sands	463	700	366	50			211	89(Na)	17	77	6.3	64	same as above
4.6 mi. S. of Lobo Sta.	Chispa Peak Farms	Bolsom Sands	360	800	357	49			206	88(Na)	17	78	4.7	64	5/2/50 sampled after pumping several days
4.6 mi. S. of Lobo Sta.	Dr. George Turner	Porous lava	267	1200	362	49			206	87(Na)	16	78	5.2	65	5/4/50 sampled after pumping several weeks
0.7 mi. S. of Lobo Sta.	D. L. Brewster	Bolsom Sands	385	800	359	49	14	4.4	208	90(Na)	16	79	4.8	66	same as above
5.8 mi. S. of Lobo Sta.	Dr. George Turner	Bolsom Sands	408	300	492	130	32	20	204	89(Na)	33	54	9.2	74	5/5/50 sampled after pumping several weeks
11 mi. S. of Van Horn at Lobo	William Cameron & Co	--	400	780	354	45	9.5	3.1	210	97(Na)	17	85	6.0	64	6/22/49 after 48 hrs. pumping
14½ mi. S. of Van Horn	James R. Williams	Alluvium	350	850	353	44	13	3.9	206	89(Na)	17	80	4.8	68	6/21/49 after 12 hrs.pumping
16 mi. S. of Van Horn	Mead [illegible] Co.	--	383	850	400	68	15	10	204	92(Na)	26	72	6.5	74	6/22/49 after 30 days pumping
18 mi. S. of Van Horn, 1 mi. S. of Lobo in Chispa Valley	Cameron Lumber Co.	--	385	700	495	49	15	4.1	210		18		7.5		8/13/48 after 6 hrs.pumping

Data obtained by R. A. Scalapino, U S. Geological Survey, El Paso (City Hall)